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THE PARADOX OF PERCENT CHANGES IN TOTAL VS. CATEGORY-SPECIFIC RATES

Population-based rates are routinely employed in public health to describe the natality, mortality, and morbidity of various populations. By and large, we have become quite comfortable with the use of these rates. However, when we proceed a step further and begin to speak of percent changes in the rates, we must remind ourselves that percent changes depend upon a base level and consequently may not behave in ways we have grown to expect.

Below are the 1989 live births and infant deaths for two race groups and for the total population. When the infant mortality rate is computed for each of these columns (infant deaths divided by live births multiplied by 1000), we are not surprised to see that the total rate falls between the white and nonwhite rates:

	1989		
	Total	**White**	**Nonwhite**
Infant Deaths	1,171	598	573
Live Births	102,091	68,455	33,636
Infant deaths per 1,000 live births	11.5	8.7	17.0

The total rate, in fact, **must** fall between the white and nonwhite rates since it is the weighted average of the two rates as illustrated below:

$$\left(8.7 \times \frac{68455}{102091}\right) + \left(17.0 \times \frac{33636}{102091}\right) \cong 11.5$$

That race-specific and total rates behave this way, and do so consistently, may tempt us to expect race-specific and total percent changes from one period to another to behave in a like manner, but this is not the case. "Percent change" is an entirely different creature.